TABLE V.—*Excess of annual death rate per 100,000 from influenza and pneumonia (all forms), by weeks, Sept. 8 to Nov. 30, 1918, over that in corresponding week of median year (1910–1916) in 42 large cities.*[1]

City.	Sept. 14.	Sept. 21.	Sept. 28.	Oct. 5.	Oct. 12.	Oct. 19.	Oct. 26.	Nov. 2.	Nov. 9.	Nov. 16.	Nov. 23.	Nov. 30.
Albany, N. Y.	37	.....	31	29	2,018	5,025	8,535	7,087	2,300	800	41	488
Atlanta, Ga.	110	.....	15	82	666	1,972	2,471	849	633	499	402	643
Baltimore, Md.	−37	−50	43	794	4,253	10,419	8,194	2,915	953	189	53	65
Birmingham, Ala.	−23	−26	−33	322	1,493	2,770	3,369	2,095	1,061	1,056	990	1,694
Boston, Mass.	188	1,634	5,015	7,925	6,680	3,765	1,350	753	343	143	172	156
Buffalo, N. Y.	17	56	96	444	1,892	5,752	7,880	4,894	1,723	743	217	216
Cambridge, Mass.	253	109	4,829	6,461	5,285	2,845	867	759	189	262	248	140
Chicago, Ill.	−53	−50	79	728	1,988	4,105	4,620	2,801	1,316	600	305	223
Cincinnati, Ohio.	− 1	−21	− 4	137	749	2,291	3,386	2,957	1,882	1,046	1,137	997
Cleveland, Ohio.	−26	− 9	− 2	44	177	928	2,818	4,282	3,256	2,132	1,403	1,113
Columbus, Ohio.	−28	40	83	170	579	1,613	2,623	2,084	1,057	721	860	1,315
Dayton, Ohio.	33	− 9	23	132	1,155	5,248	5,352	4,463	2,535	688	45	359
Fall River, Mass.	.....	264	715	3,863	8,095	7,730	3,863	1,533	869	447	267	128
Grand Rapids, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,059	788	628
Indianapolis, Ind.	− 6	44	111	356	745	2,210	1,968	1,402	926	735	967	1,653
Jersey City, N. J.	−65	− 2	242	973	3,666	.....	6,823	.....	.....	.....	.....	.....
Kansas City, Mo.	28	.....	103	47	1,521	2,713	3,117	3,173	2,177	1,198	921	1,461
Los Angeles, Calif.	36	−14	−42	70	576	1,144	2,625	3,435	2,759	2,664	1,688	1,405
Louisville, Ky.	20	143	26	228	1,889	3,764	3,770	1,348	1,098	678	584	1,159
Lowell, Mass.	−15	311	1,451	4,358	6,644	5,441	3,902	1,311	252	242	375	−73
Memphis, Tenn.	.....	.....	.....	.....	2,624	6,042	5,479	2,254	.....	392	402	−20
Milwaukee, Wis.	.....	− 4	91	108	711	1,215	1,915	1,328	971	675	427	873
Minneapolis, Minn.	−19	.....	97	120	592	1,280	1,963	1,541	1,191	1,151	575	490
Nashville, Tenn.	21	.....	45	124	5,538	8,327	5,420	2,206	2,135	446	464	747
Newark, N. J.	.....	9	27	565	2,205	4,799	5,123	4,444	2,014	1,200	687	501
New Haven, Conn.	.....	−32	401	1,102	2,479	4,906	6,033	5,519	2,615	1,459	503	621
New Orleans, La.	−23	.....	−54	294	1,852	8,385	9,156	4,368	1,957	822	281	356
New York, N. Y.	−20	11	93	629	2,010	4,107	5,091	4,259	2,122	885	473	223
Oakland, Calif.	19	.....	−32	− 9	354	936	3,271	5,679	3,728	1,603	811	164
Omaha, Nebr.	−53	.....	−26	121	1,887	4,547	4,164	2,618	.....	1,245	929	790
Philadelphia, Pa.	− 3	31	157	2,014	7,716	13,515	8,841	3,448	986	350	154	106
Pittsburgh, Pa.	−18	14	146	430	805	3,197	4,816	5,269	6,726	4,369	3,070	2,293
Providence, R. I.	3	115	348	1,868	3,587	4,948	4,210	2,558	1,162	575	502	290
Richmond, Va.	66	31	57	1,246	4,149	6,275	4,025	2,166	760	586	243	577
Rochester, N. Y.	−42	−49	61	32	612	1,902	4,077	3,989	1,914	886	646	585
St. Louis, Mo.	15	17	57	82	478	1,135	1,436	1,581	1,378	1,358	1,089	1,374
St. Paul, Minn.	21	.....	12	−32	1,177	1,458	1,091	2,000	2,141	2,664	1,705	1,306
San Francisco, Calif.	−28	53	55	50	92	1,300	5,899	7,927	4,397	2,041	857	466
Syracuse, N. Y.	.....	.....	1,150	4,410	6,991	8,085	4,425	2,088	784	610	83	76
Toledo, Ohio.	−20	.....	30	−13	101	886	2,642	2,168	1,575	769	690	421
Washington, D. C.	68	52	373	2,174	6,257	7,989	4,955	2,240	584	394	312	364
Worcester, Mass.	141	438	2,955	5,891	6,813	4,702	2,465	1,662	.....	272	744	462

[1] The weekly rates for the median year in the period 1910–1916 have been approximated by plotting the rate for the median year for each month (thus affording a rough "normal" seasonal curve) for each city, and then by reading from the curve the indicated median rate at the mid-point for each week. The excess has been found by subtracting this median rate from the actual rate for each week in 1918. When the difference is "minus" it is so indicated.

IVY AND SUMAC POISONING

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INTRODUCTION.

The fact that certain species of plants belonging to the Rhus or Sumac family exert a poisonous action upon the skin of persons susceptible to their influence, has long been a matter of general recognition. Inasmuch as the poisonous growths possessing this characteristic thrive in America, and are especially prolific in certain sections of the country, it seems desirable from a health standpoint to bring together the general information on this subject in

order that the public may become better acquainted with the nature of these plants, methods by which they may be recognized, and the various means of preventing their toxic effects. The sum total of the incapacity and economic loss arising from this cause can scarcely be estimated, to say nothing of the bodily discomfort which commonly ensues, but certainly they are sufficient to justify a more widespread knowledge of the practical aspects of the Rhus problem.[1]

DESCRIPTION OF THE PLANTS.

The native forms of Rhus[2] which produce skin eruptions belong to several species distinct botanically, including the vines and shrubs known as poison ivy and poison oak, and also the poison sumac shrub or tree. Despite their variety of form these plants are closely related and possess certain prominent peculiarities by which they can usually be distinguished without difficulty, so that by acquiring some slight knowledge of the characteristic appearance of their leaves, fruit, winter buds, and of their habit of growth, one may readily avoid them at all seasons of the year.

Poison Ivy and Poison Oak.

Poison ivy and poison oak occur as woody perennial vines or as low erect plants, or trailing shrubs, and are most readily distinguished by their leaves, which are always divided into three leaflets, and by their smooth, whitish, waxy fruits, which resemble mistletoe berries in appearance but vary in size from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch in diameter and contain a single stony seed. Of the various names applied to these plants in different localities the commonest are poison ivy, poison oak, mercury, picry, climbing or trailing sumac, and poison vine. For purposes of recognition and consideration with respect to their poisonous properties, the several botanical species may be included under one general description, although great variations in character of growth and in the forms of the leaflets are found, in many instances even on individual plants.

While the names poison oak and poison ivy are used interchangeably, the term poison oak is often restricted to plants with an erect or bushlike habit of growth and with leaflets resembling certain types of oak foliage. Thus the plant generally known as poison oak[3] throughout the Pacific coast region from Lower California and Arizona to Canada, occurs as a bush, sometimes attaining a height of

[1] Through the work of a number of investigators, knowledge of the toxic group of Rhus plants has been greatly increased in recent years with respect not only to the nature of the poisonous principle but also to the dermatitis produced by it. In the present bulletin the results of these investigations have been freely consulted in preparing a general summary of the available information on the subject. To those desirous of obtaining more detailed information, the references found on page 458, which, however, do not constitute a complete bibliography of the literature, may be of assistance.

[2] The species of poison ivy and poison sumac are grouped by some botanical authors under the generic name *Toxicodendron*.

[3] *Rhus diversiloba* Torr. and Gray.

FIG. 1.—Poison oak, *Rhus diversiloba* TORR and Gr., of California and the Pacific Coast.

FIG. 2.—Poison ivy, *Rhus radicans* L. Branches of poison ivy vine showing leaves, aerial rootlets, and flowers.

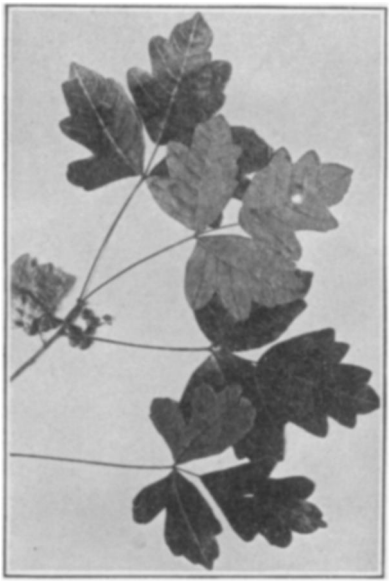

FIG. 3.—Poison oak, *Rhus quercifolia* (Michx.) Steud., of eastern United States.

FIG. 4.—Poison oak, *Rhus rydbergii* Small. A western form known as Rydberg's poison oak.

FIG. 5.—Leaves of poison ivy, *Rhus radicans* L.

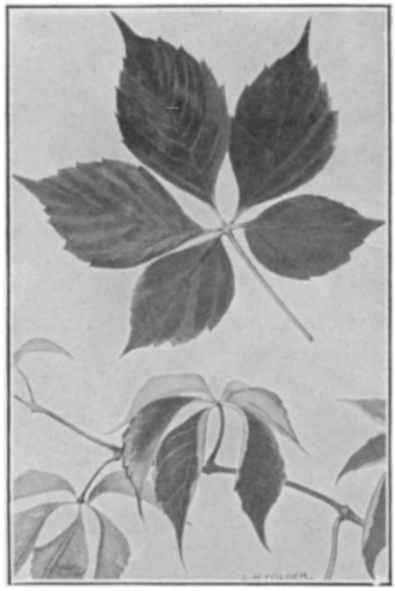

FIG. 6.—Leaves of Virginia Creeper, *Parthenocissus quinquefolia* L. Planch.

FIG. 7.—Poison sumac, *Rhus vernix* L.

4 or 5 feet, and has leaflets (Fig .1) resembling leaves of the western oaks; but it is also found growing as a vine, and is sometimes called poison ivy. In the East, from New Jersey, Delaware, and Virginia, south and southwestward, the name of poison oak[1] is often used to distinguish from the poison ivy vine[2] (Fig. 2), a form growing as a bush (Fig. 3), with lobed leaflets somewhat suggestive of leaves of scrub oak; while westward from Minnesota, Nebraska, and Arkansas, to Washington, Montana, Colorado, and New Mexico, this name is applied to a low bush[3] or trailing shrub form (Fig. 4) which does not climb.

Familiarity with any one of the forms (Figs. 1 to 5) will enable even the careless observer to recognize poison ivy or poison oak wherever encountered, whether as a vine, trailing shrub or bush, or at least to avoid readily all plants bearing a suspicious resemblance to it. The vines attach themselves to trees, walls, fences, rocks, or any adjacent support by means of aerial rootlets, and are without the twining tendrils found on many climbers. They sometimes climb to the tops of the highest trees, and are occasionally found with stems 3 or 4 inches in diameter. The forms growing as erect bushes, or shrubs with trailing underground roots, usually attain a height of a few inches to about 3 feet, but in favorable situations are often found as bushes of luxuriant growth 4 or 5 feet high. The leaves of all forms have stout, rather long stems, bearing 3 leaflets, 2 of which are opposite and short-stalked, while the third or terminal leaflet is long-stalked. The leaflets are from 1 to 4 inches long, dark green on the upper surface, lighter, sometimes with a velvety covering of fine hairs underneath, with smooth or more or less indented margins, and of the variable forms herein illustrated (Figs. 1 to 5). The tendency of the leaflets to form irregular, notched, and indented margins is an aid to the identification of the plants; and in forms with generally smooth margins, a deep notch or several indentations on one side of the leaflets (Fig. 5) are characteristics which often serve to confirm the identification. Small, inconspicuous, yellowish-green flowers, borne in loose branching clusters about 1 to 3 inches long, growing out of the angles between leaf stalks and plant stem or above scars along the sides of the branches, appear in early summer and are followed by the small, globular, smooth, green fruits which become white or ivory color as they ripen. These waxy fruits, which remain on the plants until late in the winter, are about one-fourth of an inch in diameter in the commoner forms. They are globular in shape, sometimes flattened or lopsided, and with the advance of the season have a tendency to dry and wrinkle, often losing their thin

[1] *Rhus quercifolia* (Michx.) Steud. The name *R. toxicodendron* has been applied to this plant by some authors, but is generally considered to refer to the poison ivy vine (R. radicans).

[2] *Rhus radicans* L.

[3] *Rhus rydbergii* Small. By some authors this is considered only a low form of *R. radicans*.

outer coating and revealing the single deeply grooved stone which they contain.

Poison ivy or poison oak in one or various forms infests practically all parts of the country except mountain elevations above about 6,000 feet and arid lands. It is found in fields, pastures, woodlands, and thickets, along roadways and streams, often also in city parks, cemeteries, and suburbs, sometimes mixed with other shrubbery in such a manner as to escape observation until attention is attracted to it by the occurrence of cases of poisoning. It adapts itself to the greatest variety of conditions, spreading through deep hollows and ravines, flourishing in dry soil and on hillsides, often spreading by underground roots from which small, erect shrubs arise, and showing the tendency to ascend trees or any support encountered in its growth. Its highly attractive foliage, which is red when the young leaves first unfold, becoming green with the advance of mild weather, and turning in autumn to beautiful shades of scarlet and orange, has led to its being preserved to some extent as an ornamental vine or shrub, and at times to the collection of its foliage by persons ignorant of its identity and injurious properties. Many cases of poisoning result in this way.

In the Eastern States, and westward as far as Wyoming and Texas, the Virginia creeper [1] (Fig. 6) is found generally in the same localities as the poison ivy vine, which it resembles somewhat in its habit of growth and in the shape of its leaflets. Probably because of this resemblance it has occasionally been reported as a source of ivy poisoning, but it is harmless to the touch and is readily distinguished from poison ivy by the fact that its leaves are divided into 3 to 5 leaflets to a stalk. Moreover, though it is sometimes supported by aerial rootlets like poison ivy, it has also numerous tendrils like those of vines of the grape family, of which it is a member, and its fruits, which are inedible, are blue in color, have red stems, and contain 2 or 3 seeds.

The fragrant, or sweet-scented, sumac, and the ill-scented sumac are Rhus shrubs with trifoliate leaves, resembling forms of poison ivy so closely that they may not be readily distinguished in some instances. Both differ from the poisonous Rhus species in their flowers, which appear in dense spikes before the leaves, and in their red fruit; they also differ in the aromatic properties indicated by their names. The fragrant sumac is found in rocky woods from Canada to Florida, and westward as far as Minnesota, Kansas, and Louisiana, while the "skunk bush" occurs from Illinois and Texas westward to Washington and California, growing in dry soil.

[1] *Parthenocissus quinquefolia* (L.) Planch.

Poison Sumac.[1]

Poison sumac grows in moist ground, usually in swamps or along low, miry banks of streams and ponds. It occurs from the New England States south as far as Florida, and westward to Minnesota, Arkansas, and Louisiana, and is known under various local names such as poison dogwood, poison elder, poison ash, thunderwood, and poisonwood. It frequently grows as a tree 10 to 20 feet high, and may attain a height as great as 30 feet, with trunk 5 to 10 inches in diameter; but it is more abundant as a shrub, with several slender, clustered stems. The trunk has smooth, light-gray bark, while the young twigs are reddish brown when they first appear, turning to orange brown by the end of their first year, and the older branches have the gray color of the trunk. The leaves are about 7 to 14 inches long, and consist of a slender stalk bearing 7 to 13 leaflets, arranged opposite one another in pairs, with a single usually long-stemmed leaflet at the end, those at the side being attached to the stalk by short stems (Fig. 7). The leaflets, which are of an elongated oval shape, with entire margins, attain a size of 3 to 4 inches long and 1½ to 2 inches wide. When they first unfold in the spring they are of a bright orange color and have a velvety covering of minute hairs, especially along the margins and underneath. This covering soon disappears. At maturity the leaflets are dark green and glossy on the upper surface, with prominent scarlet midribs, and lighter green underneath. Early in summer minute yellowish-green flowers appear in narrow clusters, about 3 to 8 inches long, growing out of the angles of the leaf stems near the end of the branches, and are followed by shining ivory white or yellowish fruits, globular in shape but somewhat longer than thick, about ¼ inch in diameter, resembling those of poison oak and poison ivy already described, and containing a single yellow grooved stone. The foliage turns early in autumn to brilliant red, orange, and russet shades. The leaves fall early; but the drooping, long, slender clusters of pearly fruit remain, often until the following spring, and, with the light gray bark and pointed purplish winter buds, are means of identifying poison sumac in its winter state.

Those persons having little familiarity with the identity of trees and shrubs occasionally confuse poison sumac with the harmless sumacs, certain species of ash, elder, and various other shrubs and trees bearing somewhat similar foliage. They also confuse it with dogwood to which it bears no resemblance. The poison sumac leaves are, however, readily distinguishable from all of those plants, while the difference in character, appearance, and color of the fruits is such as to enable one to exclude them without difficulty. It is well to re-

[1] *Rhus vernix* L.

member also that the poison sumac occurs on moist or swampy land, and in drier locations it is found only along the borders of swamps and bogs or where the ground is wet during part of the year.

Its loose, drooping clusters of flowers, and later of ivory-white fruits, are entirely different in appearance from those of the harmless sumacs of the region in which it grows. These latter produce flowers and fruits on densely covered upright terminal spikes which are of a conspicuous red shade in the fruiting stage. Aside from conspicuous differences in form, the number of leaflets into which the leaves of the harmless sumacs are divided, which ranges from 9 to 21 and 31 in the commoner species, as compared with 7 to 13 in the poison sumac, is a further aid in distinguishing them.

The statement that native forms of sumac with red fruit are harmless should, perhaps, be qualified with respect to a rare form occasionally found from North Carolina to Georgia, and which has been reported as poisonous by various writers and declared harmless by others. This is a low shrub 1 to 3 feet high, spreading by underground roots. Its leaves are 12 to 14 inches long, and consist of about 11 broadly oval leaflets about 2½ inches long and 1½ inches wide, stemless or very short stalked with the exception of the terminal leaflet which has a stalk three-fourths of an inch long with winged margins. Its flowers are produced in dense clusters at the ends of branches, and its fruit is bright scarlet when ripe, and covered with fine silky hairs.

A near relative of the above-described forms is the poison wood or hog gum-tree of the West Indies, also known as coral sumac, which occurs in the hummock lands of southern Florida. Its sap is said to be dangerously poisonous to touch, and inflammation of the skin is reported to have been caused by mere proximity to the plants. The plant is usually seen as a small tree, but sometimes attains a height of over 35 feet, with short trunk 2 feet thick. The bark is of a reddish brown color, separating into plate-like scales, between which the bright orange color of the inner bark is seen, and marked by dark spots caused by exudations of a resinous gum. The gum of this tree, collected by incising the bark, is employed medicinally to some extent as an emetic, diuretic, and purgative. The leaves are 9 to 10 inches long and consist of a stout stalk, thickened at the base, bearing 5 to 7 (or sometimes 3) oval or almost heart-shaped leaflets 1 to 4 inches long. The leaflets have short stalks, are glossy green on the upper surface and dull underneath, and have smooth margins. The tree produces small yellowish-green flowers in clusters about 10 inches long, followed by bright orange-colored, oblong, one-stoned fruits about three-fourths of an inch long.

NATURE OF THE POISON.

The various toxic species of Rhus apparently cause skin irritation through the same toxic principle. The nature of this poison has long been a matter of study, but it now seems to be established that it is an oily principle, called toxicodendrol, which can be extracted from the leaves, roots, flowers, green fruits, and in fact all parts of the plant with the possible exception of the pollen and ripe fruit. Experiments have shown that the minutest quantities of this oil can produce poisoning. Consequently, contact of the body with the growth, however slight, may result in the transference to the skin of enough of the poisonous principle to exert its poisonous effects. It is not necessary that this contact should be direct, as an intermediate object can transfer the poison to the skin; for example, articles of clothing or farm implements which have brushed against the plants may be later handled, thus giving rise to poisoning, and the possibility of contracting it from horses, dogs, or other animals which have been in contact with the plants should not be overlooked.

While there is reason for believing that the nonvolatile toxicodendrol is the sole toxic principle concerned, it was formerly supposed that Rhus poisoning was caused by volatile emanations from the plants, and there is still much diversity of opinion concerning the matter. Apparently authentic cases of Rhus poisoning which appear to have originated without direct or indirect contact with the plants have been reported. Many persons who know the plants and are careful to avoid them are convinced that they have been poisoned by passing by them or observing them from a short distance. Cases of this kind are sometimes attributed to transference of the poison by minute particles or other dust from the plants, possibly pollen or leaf hairs, which might be borne through the air for considerable distance. Although it seems to have been shown conclusively that the poison is not formed or normally contained in either pollen or leaf hairs, this does not exclude the possibility that they might take it up by coming in contact with other parts of the plant. It is probable however, that many cases supposed to have originated in this way have actually been due to direct or indirect contact. The exact manner in which the poisoning has occurred may readily be overlooked, since in many instances the appearance of the eruption is delayed for several days and traces of the poison sufficient to produce injury may be conveyed by clothing or other articles long after contact with the plants. Numerous attempts to produce poisoning experimentally by emanations from Rhus plants, and from the oil itself, have been unsuccessful. On the other hand, there is excellent foundation for the popular belief that smoke from the burning plants will give rise to irritation, and some of the worst cases of Rhus poisoning undoubtedly originate in this manner.

Taken internally in toxic doses, the plant is reputed to have the properties of a violent irritant and narcotic poison. Cases of poisoning of children from eating the fruit have been reported. Horses and cattle eat poison-ivy foliage freely, apparently without any ill effects, at least from the relatively small amounts consumed under usual conditions.

SUSCEPTIBILITY.

It has long been a matter of observation that certain individuals possess a marked degree of resistance to the action of Rhus toxin. It is not strange that they should thus come to regard themselves as immune, although there is good reason for believing that absolute immunity does not exist. Experiments with persons of this type have shown that when they are subjected to prolonged exposure, or to the application of the toxic principle of the plant itself, they react to some degree and are therefore not immune.

That varying degrees of susceptibility to the poison exist, there can be no doubt; but here again we are on treacherous ground, as a person may be repeatedly exposed without noticeable symptoms only to have his pride humbled upon a subsequent exposure. Some individuals are not ordinarily susceptible to ivy but do react to sumac. Since the poison in the two plants is apparently the same, the difference is explained by the fact that the sumac generates and distributes the toxin in larger quantities than does the ivy. Likewise, certain individuals claim to be insusceptible to the leaves but admit that the smoke, which contains a finely divided but heavy dosage of the toxin, causes symptoms. The rule can be offered that whenever a large amount of toxin is deposited upon the skin, and the person is markedly susceptible, the reaction will be severe, whereas if the dosage is small and the susceptibility slight, the reaction will be mild, in fact so light in some cases as to be unnoticeable. The actual contact with the plant may occur in such a way as to cause little or no transference of the toxin, and consequently no noticeable effects in an individual who on another occasion may be severely poisoned through acquiring a heavier dosage, particularly from freshly bruised stems or leaves.

For the same reason the plants are most poisonous in the spring and summer when their acrid juice is abundant, although they retain their poisonous property even long after drying, and injury from old herbarium specimens is not uncommon. Certain local conditions, such, for example, as the thickness of the integument, and the state of the skin as regards perspiration at the time of exposure or subsequent thereto, may serve, however, to modify the irritation.

SYMPTOMS.

The time elapsing between exposure and the earliest manifestation of symptoms varies from a few hours to 5 days or even longer, depending upon the susceptibility of the individual, the degree of exposure, and the amount of resistance of the parts involved.

The hands, forearms, and face are most often attacked, as they are especially subject to exposure. The feet and legs of barefoot children, for manifest reasons, also afford a favorite site for the eruption. Other regions of the body, such as the trunk, the genital organs of males, or the breasts of females, often become involved either as a result of direct exposure or the conveyance of the irritant to these parts by the hands, clothing, or through bathing. A tub bath is frequently the means of disseminating the irritant to sections of the body other than those primarily affected, and the disease in exceptional instances may even originate from contact with the clothing or skin of some other person, so that in a sense it is "catching."

The symptoms of an ordinary attack of Rhus poisoning vary considerably. The earliest evidence of trouble is a slight itching or burning sensation. As the inflammation develops, the itching and burning become more intense, at times causing marked annoyance and even disturbance of sleep. Scratching affords partial relief, but inasmuch as the inflammation is aggravated in this way and the poison may be distributed to unaffected sections, it should be resisted. Occasionally, patients of some phlegmatic type will be met with who make little complaint of either itching or burning, but usually these are the most distressing symptoms. In severe cases, or when infection by pus germs has occurred, actual throbbing pain may be present, especially in dependent parts.

The skin eruption shows wide diversity. It may consist merely of reddening of the involved surfaces, accompanied by swelling, the redness being in proportion to the degree of inflammation. More often small vesicles, containing serum, develop, usually in streaks or patches. The coalescence of several of these spots results in the formation of blebs, or blisters, which may cover a square inch or more of surface. When these serum-containing lesions rupture, their contents are discharged, producing a moist or weeping effect, such as is often seen in acute eczema. In moderately severe cases, pustules form, the pus pockets resulting from the entrance of germs which are normally present upon the skin or which have been introduced by scratching. Scab formation in the latter stages is common. Any or all of these lesions may accompany the inflammation so that the skin frequently presents a decidedly angry appearance. After the subsidence of the inflammation, peeling of the integument occurs, the layers of the skin often coming away in large patches, leaving a

denuded surface of the new skin beneath. The desquamation takes place within from a few days to a week or more after recovery, and may, in mild cases, be so slight as to escape observation.

Swelling and oedema of the parts involved nearly always occur. If the tissues making up the inflamed area are lax, as for example about the eye or scrotum, the swelling is apt to be pronounced. Quite commonly, one, or even both eyes may be entirely closed, the ear may become twice its customary size, the lips distorted, and other parts have their normal lines obscured. The swelling usually terminates as rapidly as it develops, and should not, under ordinary conditions, occasion undue alarm.

In certain complicated cases, where the invasion by pus germs is particularly severe, small abscesses may form. Such cases are accompanied by enlargement and tenderness of near-by glands, by pain, fever, and other evidences of constitutional disturbance. In rarer instances ulcers develop; complications of this character are apt to be followed by scars. Ordinarily, however, the disfigurement from Rhus poisoning is but temporary, the skin soon regaining its normal color and appearance. Occasionally when a person is exposed to the irritant at frequent intervals, a more or less chronic inflammation of the skin resembling eczema develops, and the sufferer is quite at a loss to know the source of his trouble.

On the whole, the skin eruption resulting from Rhus poisoning does not differ materially from that caused by a number of other irritant poisons, as, for example, such chemicals as bichloride of mercury, arsenic, and certain anilin compounds contained in dyes. It is well to know that identical effects are also sometimes produced by urine, pus, and other irritating bodily discharges. The seasonal prevalence of the inflammation, the history of exposure, and the fact that Rhus poisoning is much more common than that brought about by other agents, will give a clue to the character of the disturbance.

PREVENTION.

Much can be accomplished toward the protection of persons who come in contact with Rhus vines, and also in preventing or lessening the disastrous effects following exposure. Toxic plants can usually be handled with impunity if rubber gloves are worn, provided none of the dust or irritating material comes in contact with the body. Care should be exercised in removing the gloves from the hands, as they necessarily will harbor the toxic material and any contact with the skin is apt to cause trouble. After the gloves have been removed they should be thoroughly washed with soap and water, rinsed several times, and laid away. The water in which the infected gloves are washed will naturally contain the poisonous principle, hence it may not be entirely innocuous. Ordinary thick gloves of firm texture,

with gauntlets to protect the wrists, may be used in place of rubber gloves, but the protection afforded is not always absolute. Inasmuch as clothing which has come in contact with the leaves may serve for an indefinite period to convey the infection, a change of garments following exposure is to be recommended, this change to include shoes, which perhaps more often than any other article are a source of indirect contagion. The anointing of the parts to be exposed with cottonseed or olive oil, or vaseline, is said to serve as a protective means of considerable value. The oil must later be completely removed by repeated washing.

In some localities the belief is prevalent that eating poison ivy leaves in the spring will confer immunity during the year, but this seems at best a dangerous experiment and severe cases of poisoning contracted in this manner have been reported. In the present state of knowledge of the subject, therefore, it is believed that attempts to confer immunity by the ingestion of leaves or extracts of the plant should be undertaken only under the guidance of a physician.

One of the surest and best methods of individual prophylaxis is the use of soap and hot water. It has been found that the Rhus poison after being deposited upon the skin requires a certain time for penetration, and if this penetration can be prevented, irritation and the resulting eruption will not occur. Hot water and soap act mechanically, and if judiciously used constitute by far not only the most serviceable preventive but also one of the best curative agents which we at present possess.

The washing should be done as soon after exposure as possible. If considerable time has elapsed—that is, from 12 to 24 hours—this method should be adopted in the hope that at least a portion of the material which has not had time to penetrate will be removed. A soft brush, or better, pieces of gauze, should be used, although there is no objection to a wash rag, provided several are available. Much harm can be done with a stiff brush vigorously wielded, as in this way the minute particles of toxic material may be driven further into the superficial layers of the skin, resulting in more acute and pronounced inflammation than otherwise would have occurred. A heavy lather should be produced and the washing continued for 4 or 5 minutes. Several pledgets of gauze should be used, each being discarded in turn, in order that the poison may not be distributed by the cloth. For the same reason the water should be changed frequently, or running water used. To obviate the danger of disseminating the poison to unaffected parts, only the exposed or diseased area should be immersed, if this is feasible. After drying the area, it is well to repeat the process in 4 or 5 hours. Alcohol exerts a solvent action upon the toxin and can be similarly used, care being taken to flush the parts with an

excess of the liquid. The alcohol should first be diluted with an equal quantity of water. Ordinarily if either of these procedures is carefully followed, much if not all of the toxic material will be removed and the inflammatory reaction prevented or greatly lessened.

Where the exposure has been more general, a bath for the entire body, with the exercise of the precautions mentioned, followed by a change of clothing, is a good preventive measure. The hair should not be neglected. A shower is to be preferred for the reasons indicated, but if this is not practicable, the water in the tub should be changed at least twice. Bathing, if improperly performed, may result in the appearance of the rash on parts of the body not at first involved, although this secondary eruption is usually less intense than that at the original focus.

Handling of the body should be discouraged. Even in those cases where the hands are not involved they are liable to harbor the toxin, hence it is easy to understand why their movements should be restricted. This will be difficult with children, and most adults will meet with considerable inconvenience in the observance of this prohibition. Freedom of movement is without danger if the hands are properly scrubbed.

TREATMENT.

If the treatment previously outlined fails to prevent the development of the skin poisoning reaction, it is still possible by intelligent effort to alleviate in large measure the distressing symptoms. Before undertaking measures for relief, one should remember, however, that any treatment for disease is more intelligently administered by a skilled physician than by a person unskilled in medical knowledge. It is also well to recall that what is indicated in one case may be contraindicated in another, and that a particular stage of a disease may, and often does, require treatment which would be disastrous were it instituted at a later period. For these reasons, therefore, it is desirable in serious cases to secure competent medical advice, if such is obtainable, and to follow strictly the directions given. Where for any reason this is not feasible, the following treatment is recommended:

If the skin is highly inflamed or the eruption extensive, it is advisable to keep the patient in bed, as rest of an inflamed part invariably hastens cure. Exposure to the sun during hot weather increases perspiration and aggravates the inflammation, hence is to be avoided. The comfort of the patient will be increased if the clothing is thin, the bedding light, and the room kept cool. Care should be exercised to see that no part of the clothing irritates the inflamed area. It is well to maintain the bowels moderately free; for this purpose a Seidlitz powder before breakfast, as necessary, is beneficial. Summer weather diet—that is, plenty of fruit, cool drinks, and frozen desserts—is indicated, particularly if moderate fever accompanies the

inflammation. Should this or other constitutional symptoms, such as pain, headache, or loss of sleep, be present, suitable remedies are to be prescribed by the physician.

For the eruption itself, scores of remedies and numerous favorite prescriptions—many of which are claimed by their advocates to possess distinctive virtues, if not specific qualities—have been recommended. In spite of these claims it is necessary to state that no specific treatment for Rhus poisoning is yet available. The very multiplicity of preparations recommended, ranging in character from brine to brimstone, and also including the juice of at least 20 different plants, in itself constitutes reasonable proof of the correctness of the above statement. The irritation is in its nature self-limited, usually requiring only a week or 10 days for its entire subsidence, hence it is easy to understand how numerous so-called cures have arisen.

For the relief of itching nothing is better than the immersion of the inflamed surface in hot water for several minutes, gradually increasing the temperature until the water is as hot as can be borne. If the eruption is on the face, the hot water can be applied by means of a thick towel. As previously mentioned, the soap-and-water treatment is distinctly curative in those cases where all of the poison has not penetrated.

It is better that the inflamed area should be left exposed to the air rather than tightly bandaged. If the bandages are kept moist with a solution of cooking soda or borax (a teaspoonful dissolved in a cup of water), or with other solutions to be mentioned, there is no objection to their use. In any event they should be frequently changed, more especially when pus has formed, or when the secretion is excessive.

Ointments, in the acute stage, should not be used; compounds with a fatty base serve to scatter the toxic oil and thus tend to aggravate rather than relieve the inflammation. In the latter stages of the disease, after the toxic material has exhausted itself and a certain amount of inflammatory reaction still persists, soothing or astringent ointments are of value.

Hot solutions of permanganate of potash (of 2 per cent strength if the skin is intact, but only half as strong if the skin is broken) have been much in vogue. The drug is thought to exert a direct action upon the poison in much the same manner as vinegar counteracts the effect of an alkali. One disadvantage of permanganate is that it stains the skin a mahogany brown of greater or less intensity; but this stain in time will wear off, or it can be immediately removed by the application of lemon juice.

A 10 per cent solution of hyposulphite of soda, photographer's fixing liquid, applied as a wet dressing, gives in many instances beneficial results. A similar solution of sulphate of magnesium, Epsom salts, is entirely harmless and allays the inflammation as satisfactorily as most other remedies. A lotion made of 1 part of the fluid extract of Grindelia to 10 parts of water, introduced as a specific, has likewise been extensively used with varying results. Since applications of solution of sugar of lead, a favorite treatment in earlier days, generally prove disappointing after the inflammation has developed, and involve the risk of lead poisoning if used over extensive areas, they are not recommended. If used in the early stages it

should be remembered that lead salts precipitate the toxin and the treatment should therefore be followed by washing to remove any traces of the poison thus deposited.

The blebs or blisters, if fully developed, should be opened with a sterile needle and the clear serum expressed with a pledget of absorbent cotton. This serum is harmless and does not spread the infection to uninvolved areas. The integument, however, should not be removed until the new skin beneath is well formed and its sensitiveness diminished. In the late stages the application of a mild boric acid or zinc oxide ointment hastens the cure.

IMPORTANCE OF DESTROYING POISON IVY.

The more general destruction of all noxious vegetation is to be encouraged by every possible means. Every landowner should feel that he is in a measure responsible for illness resulting from exposure to irritating plants growing upon his premises, even if such illness or incapacity does not happen to occur among members of his own household, and he should adopt such means as are necessary for the elimination of this dangerous material. Communities should see that poison ivy flourishing by public waysides and in parks is destroyed. It is, of course, realized that this destruction can not always be brought about in a single season, as these plants are particularly persistent in their growth, frequently springing up in diminished amount year after year even when they are supposed to be totally destroyed; but if continued effort in this direction is made, ultimate success is sure.

In dealing with this problem of eradication in rural districts, it may be possible to secure the cooperation of a group of neighbors whose combined efforts will greatly enhance the effectiveness and thoroughness of the work. It is not unusual to find that a single vine growing close to a frequented walk, or perhaps in the farmer's dooryard, is the cause during the season for many cases of suffering, and the country boy who has undergone seasonal torment from ivy poisoning can frequently vividly recall the identical vine which gave rise to his attacks. There is little reason for permitting dangerous conditions of this character to persist. The fact that climbing vines of the Rhus family enhance the beauty of the surroundings should not stand in the way of destructive measures, as their very beauty, enticing as it is to the uninitiated, makes them the more dangerous. Since relatively few people are able to recognize the various toxic plants—and even when this recognition is possible, exposure can not always be avoided—destruction of those plants is the only sure means of prevention.

Knowledge concerning harmful plants and their identification may well be disseminated as a part of the courses of instruction in public schools. The differences between poison ivy and the harmless Virginia creeper, and the characters by which the several forms of

sumac may be contrasted, afford a most interesting addition to natural-science courses and can easily be made the topic of a lesson of practical value even for children in the lower grades. Considerable success has been achieved in this way in teaching children in malarious regions to distinguish between disease-carrying and nondisease-carrying mosquitoes. Lessons of this character constitute a profitable form of nature study and can be made particularly attractive even to the dullest pupil.

Methods of Eradication.

For the removal of poison ivy it is sometimes possible to employ persons who are not readily susceptible to Rhus poisoning, but the exercise of the protective measures already suggested should enable anyone to undertake the work without injury. Those who are highly susceptible to the slightest exposures, and who on that account have special cause to fear the plants, may incur less risk by undertaking the work of eradication in late fall after the sap is out of the plants, which are then less likely to produce injury.

The means to be employed may be determined largely by convenience. The most rapid and effective method of dealing with isolated clumps of poison ivy is simply to grub them out, taking care to remove thoroughly the running rootstocks, which, if left in the ground would soon produce another crop of the plants. In infested fields the plants may be destroyed by plowing up the soil and planting cultivated crops. The plants can be killed by mowing repeatedly so as to exhaust the root system by destroying the foliage as fast as it appears, but to be successful, the mowing should be carried out persistently.

The use of kerosene has been recommended by the Forest Service of the United States Department of Agriculture, after thorough investigation and trial, as an effective means of destroying poison ivy in situations where injury to other plants is not to be feared. In many cases one thorough wetting with this agent, applied by sprinkler or spraying pump, will be sufficient. Where the growth is so thick that only a part of the foliage is reached by the first treatment, a second application is sometimes necessary. The effectiveness of the treatment will be increased if the soil is disked or cut up slightly so as to expose the roots to the action of the kerosene. It must be remembered that kerosene will injure or destroy all vegetation and is therefore not available for use near valuable trees. On the other hand, the usefulness of the soil is not long impaired, locations where the ivy has been exterminated by this method in the spring or summer being found covered with new growth of other plants by fall. Crude petroleum, which has the advantage of being less expensive than kerosene, has been found equally effective, but it is less suitable in places where it is desired to avoid prolonged detriment to the soil.

In work undertaken by the Massachusetts Experiment Station it was found that arsenite of soda could be used very successfully to kill poison ivy on stone walls, buildings, and along fences, and on large trees over 6 to 10 inches in diameter without injury to the trees. In these experiments a solution prepared by dissolving 1 to 2 pounds of sodium arsenite in 10 gallons of water was found effective. For destroying patches of poison ivy, 10 gallons of this solution will be required per square rod. It has the disadvantage of being equally injurious to small trees and other desirable vegetation, and may render the land useless for cultivation during a prolonged period. As the preparation is poisonous, care should be exercised to keep horses and other live stock away from the poisoned plants.

Other methods employed include spraying with hot brine of a strength of 3 pounds of salt per gallon of water, repeated several times during the spring or summer at intervals of 10 days to 2 weeks, or the application of strong chemicals, such as concentrated sulphuric acid. The use of corrosive chemicals, however, involves a risk of injury to the user which is needless in view of the availability of safer means of eradication.

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